Request for Proposal

Marshall County Schools H. W. Byers Attendance Center

Strategic Energy Management (SEM) Uplift for Schools

Contents

* Not a biddable project

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1. Overview

Introduction

This Request for Proposal is for Energy Upgrade initiatives at the Marshall County Schools H. W. Byers Attendance Center. The following Energy Conservation Measures (ECM's) are included. Those projects in red are not biddable, and will be performed by the school system.

- Lighting Upgrades
- Lighting Controls
- Window Film Installation
- Computer Plug Loads – Management Software
- Vending Machine Controls
- Ice Machine and Refrigerated Cases
- HVAC Controls – Labor Only
- Door Weatherstripping
- Water Heater Setpoint
- Refrigerator and Freezer Consolidation
- Laptop Charging Carts

These initiatives will be achieved with the assistance of TVA's School Uplift program.

"In keeping with TVA's mission of service, School Uplift is our way of supporting local schools. Through strategic energy management (SEM) training and investment, we're helping high-need schools reduce energy costs while making classrooms throughout the region brighter, safer, and happier places to learn and grow.

TVA EnergyRight's School Uplift supports schools in the region by reducing energy costs and improving the quality of the learning environment."

Location:

H. W. Byers Attendance Center
4178 Highway 72 East
Holly Springs, MS 38635

RFP Submission Deadline	**June 10, 2022**
Vendor Scoring and Selection	**June 20, 2022**
Requested Work Completion	**July 31, 2022**

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H. W. Byers Attendance Center

The H. W. Byers Attendance Center, located in Holly Springs, MS, is a publicly funded school district that educates children in Marshall County. It was originally built in 1958, has various additions, and is comprised of several buildings totaling 89,185 square feet of conditioned space. The typical school design consists of classrooms, front offices, a cafeteria with attached kitchen, and two gymnasiums.

The school hosts approximately 600 students every year in grades K-12. The building operates 10 months out of the year, with two months of shutdown during the summer break. The typical hours of operation are from 6:45 am to 2:45 pm, and a modified schedule during fall, winter, and spring breaks and weekends.

2. Energy Conservation Measures (ECM's)

2.1 Lighting Upgrades

Affected School Rooms
Entire School

Existing Conditions
Fulton High School is currently illuminated by T8, T5HO, incandescent, CFL, HPS, metal halide, and LED lighting fixtures. The most prominent lighting technology used within the school is T8 lamps, followed by LED lamps.

Upgrade Recommendation
The existing lighting is recommended to be upgraded using retrofitting kits to convert existing fixture housings to integral LED fixtures, with the remainder of the lighting fixtures to be replaced with new integral LED fixtures. In a few cases, for specific areas, LED bulb replacements are suggested instead of full fixture replacements. Suggested retrofit and replacement applications meet or exceed existing perceived light levels for the applicable area.

Quality of Life Implications
All of the replacements suggested will help to reduce the amount of energy used by the school. Replacing with LED technology will allow for significant kWh savings which in turn equates to a substantial reduction in energy and maintenance costs. To the occupants there will be a moderate visible change, including improved light levels and greater uniformity. The maintenance staff will notice there will be a lower
frequency of lamp and ballast replacements.

2.1 Lighting Upgrades

Location	Existing Fixture	Existing Qty.	Proposed Fixture	Proposed Qty.
High School Bldg - Elevation - Main Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
High School Bldg - Elevation - Principle's Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	3

High School Bldg - Elevation - Assist. Principle's Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	2
High School Bldg - Elevation - Corridor	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	38	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	38
High School Bldg - Elevation - Elec. Closet #1	1L, 8.5W, LED, surface mounted exposed with electronic ballast	2	Do nothing - Fixture to remain	2
High School Bldg - Elevation - Faculty RR	1L, 8.5W, LED, surface mounted exposed with electronic ballast	2	Install new wall-mounted occupancy sensor to reduce fixture burn hours.	2
High School Bldg - Elevation - Women's RR #1	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	2
High School Bldg - Elevation - Men's RR #1	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	2
High School Bldg - Elevation - Faculty Lounge	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
High School Bldg - Elevation - Room #56	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
High School Bldg - Elevation - Room #57	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	18	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	18
High School Bldg - Elevation - Room #58	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
High School Bldg - Elevation - Room #58 Closet	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	2
High School Bldg - Elevation - Room #59	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
High School Bldg - Elevation - Room #61	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
High School Bldg - Elevation - Room #63	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
High School Bldg - Elevation - Room #64	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8

High School Bldg - Elevation - Room #65	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
High School Bldg - Elevation - Room #66	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
High School Bldg - Elevation - Room #67	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
High School Bldg - Elevation - Room #68	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	12	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	12
High School Bldg - Elevation - Elec. Closet #2	1L, 8.5W, LED, surface mounted exposed with electronic ballast	3	Do nothing - Fixture to remain	3
High School Bldg - Elevation - Women's RR #2	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	2
High School Bldg - Elevation - Men's RR #2	3L, 32W, T8, surface mounted 1x4 strip with electronic ballast	3	1L, 50W, LED (GE RLB2-R4-0-70-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast	3
High School Bldg - Elevation - Room #71	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	9	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	9
High School Bldg - Elevation - Room #72	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	9	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	9
High School Bldg - Elevation - Room #72	1L, 60W, incandescent, lamp mounted exposed with ballast	7	1L, 9W, LED (GC #58037), lamp mounted exposed with electronic ballast	7
High School Bldg - Elevation - Room #73	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	9	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	9
High School Bldg - Elevation - Room #74	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	9	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	9
High School Bldg - Elevation - Exterior	1L, 15W, LED, surface mounted canopy with electronic ballast	3	Do nothing - Fixture to remain	3
High School Bldg - Elevation - Exterior	1L, 26W, TTT, recessed downlight with electronic ballast	2	1L, 17.5W, LED (Lithonia LDN4RV-40/15-LR4AR-LSS), recessed downlight with electronic ballast	2
High School Bldg - Elevation - Exterior	1L, 70W, HPS, surface mounted wall pack with magnetic ballast	2	1L, 25W, LED (GC #97973), surface mounted wall pack with electronic ballast	2
Two-Room Portable - Elevation - Room #1	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	14	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	14

Two-Room Portable - Elevation - Room #2	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	15	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	15
Two-Room Portable - Elevation - Exterior	1L, 7W, LED, surface mounted wall pack with electronic ballast	2	Do nothing - Fixture to remain	2
Locker Portable - Elevation - Room #1	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	12	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	12
Locker Portable - Elevation - Room #2	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	12	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	12
Locker Portable - Elevation - Exterior	1L, 7W, LED, surface mounted wall pack with electronic ballast	2	Do nothing - Fixture to remain	2
Concessions Bldg - Elevation - Concessions	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	2	1L, 50W, LED (GE RLB2-R4-0-70-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	2
Concessions Bldg - Elevation - Women's RR	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 49W, LED (Lithonia CLX-L48-7000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast and new dimmer switch	1
Concessions Bldg - Elevation - Women's RR	1L, 13W, CFL, surface mounted exposed with electronic ballast	1	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	1
Concessions Bldg - Elevation - Men's RR	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 49W, LED (Lithonia CLX-L48-7000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast and new dimmer switch	1
Concessions Bldg - Elevation - Men's RR	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	1
Concessions Bldg - Elevation - Exterior	2L, 60W, BR incandescent, surface mounted flood with ballast	2	2L, 9.5W, LED (TCP #LED10A19DOD41KW), surface mounted exposed with electronic ballast	2
Sports Field - Elevation - Exterior	1L, 400W, metal halide, pole mounted flood with magnetic ballast	58	Do nothing - Fixture to remain	58
Large Gym Bldg - Elevation - Corridor	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	15	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	15
Large Gym Bldg - Elevation - Janitor's Closet	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Install new wall-mounted occupancy sensor to reduce fixture burn hours.	1
Large Gym Bldg - Elevation - Women's RR #1	1L, 100W, incandescent, surface mounted exposed with ballast	1	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	1

Large Gym Bldg - Elevation - Women's RR #1	2L, 13W, TTT, surface mounted canopy with electronic ballast	1	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	1
Large Gym Bldg - Elevation - Men's RR #1	1L, 13W, CFL, surface mounted exposed with electronic ballast	1	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	1
Large Gym Bldg - Elevation - Library	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	32	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	32
Large Gym Bldg - Elevation - Library Closets	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	2	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	2
Large Gym Bldg - Elevation - Room #50	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	6	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	6
Large Gym Bldg - Elevation - Room #52	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	6	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	6
Large Gym Bldg - Elevation - Room #52	1L, 60W, incandescent, surface mounted exposed with ballast	1	1L, 9W, LED (GC #58039), surface mounted exposed with electronic ballast	1
Large Gym Bldg - Elevation - Room #52 Office	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	1
Large Gym Bldg - Elevation - Room #52 RR	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Install new wall-mounted occupancy sensor to reduce fixture burn hours.	1
Large Gym Bldg - Elevation - Room #52 Closet	1L, 13W, CFL, surface mounted exposed with electronic ballast	1	1L, 9W, LED (GC #58039), surface mounted exposed with electronic ballast	1
Large Gym Bldg - Elevation - Computer Lab	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	2	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	2
Large Gym Bldg - Elevation - Shop Class	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	6	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	6
Large Gym Bldg - Elevation - Shop Closet	1L, 13W, CFL, surface mounted exposed with electronic ballast	1	1L, 9W, LED (GC #58039), surface mounted exposed with electronic ballast	1
Large Gym Bldg - Elevation - Shop Office	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	1
Large Gym Bldg - Elevation - Shop	4L, 32W, T8, pendent mounted 2x4 low bay with electronic ballast	15	1L, 68W, LED (GE ABV3-0-12-T-48-1D-DF-ST-K-Q-W), pendent mounted 2x4 low bay with electronic ballast and new dimmer switch	15
Large Gym Bldg - Elevation - Shop	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Install new dimmer switch to reduce fixture burn hours.	1

Large Gym Bldg - Elevation - Gym	4L, 32W, T8, surface mounted 1x8 strip with electronic ballast	10	1L, 63W, LED (GE RLB2-D8-0-10-V1-840-TT-RM-WHTE), surface mounted 1x8 strip with electronic ballast and new dimmer switch	10
Large Gym Bldg - Elevation - Gym	6L, 32W, T8, pendent mounted 2x4 high bay with electronic ballast	24	1L, 109W, LED (GE ABV3-0-18-T-48-1D-DF-ST-K-Q-W), pendent mounted 2x4 high bay with electronic ballast and new dimmer switch	24
Large Gym Bldg - Elevation - Gym Rooms	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	7	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast and new dimmer switch	7
Large Gym Bldg - Elevation - Gym Rooms	1L, 8.5W, LED, surface mounted exposed with electronic ballast	11	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	11
Large Gym Bldg - Elevation - Gym Rooms	1L, 13W, CFL, surface mounted exposed with electronic ballast	6	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	6
Large Gym Bldg - Elevation - Gym Rooms	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 49W, LED (Lithonia CLX-L48-7000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	1
Large Gym Bldg - Elevation - Gym Rooms	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	4
Large Gym Bldg - Elevation - Gym Corridor	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	1
Large Gym Bldg - Elevation - Gym Corridor	2L, 13W, TTT, surface mounted canopy with electronic ballast	2	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	2
Large Gym Bldg - Elevation - Gym Corridor	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	4	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	4
Large Gym Bldg - Elevation - Gym Locker Room #1	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	3	1L, 49W, LED (Lithonia CLX-L48-7000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	3
Large Gym Bldg - Elevation - Gym Locker Room #1	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Do nothing - Fixture to remain	1
Large Gym Bldg - Elevation - Gym Locker Room #2	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	3	1L, 49W, LED (Lithonia CLX-L48-7000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	3
Large Gym Bldg - Elevation - Gym Locker Room #2	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Do nothing - Fixture to remain	1

Large Gym Bldg - Elevation - Gym Locker RR	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	3	1L, 49W, LED (Lithonia CLX-L48-7000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	3
Large Gym Bldg - Elevation - Gym Locker RR	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Do nothing - Fixture to remain	1
Large Gym Bldg - Elevation - Gym Laundry Room	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	2	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast and new dimmer switch	2
Large Gym Bldg - Elevation - Gym Laundry Room	1L, 8.5W, LED, surface mounted exposed with electronic ballast	2	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	2
Large Gym Bldg - Elevation - Gym Laundry Room	2L, 17W, T8, surface mounted 1x2 strip with electronic ballast	1	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	1
Large Gym Bldg - Elevation - Concessions	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	2	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	2
Large Gym Bldg - Elevation - Conc. Women's RR	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	4	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast	4
Large Gym Bldg - Elevation - Conc. Men's RR	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	3	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast	3
Large Gym Bldg - Elevation - Exterior	2L, 60W, BR incandescent, surface mounted flood with ballast	5	2L, 9.5W, LED (TCP #LED10A19DOD41KW), surface mounted exposed with electronic ballast	5
Large Gym Bldg - Elevation - Exterior	1L, 15W, LED, surface mounted canopy with electronic ballast	2	Do nothing - Fixture to remain	2
Large Gym Bldg - Elevation - Exterior	1L, 7W, LED, surface mounted wall pack with electronic ballast	4	Do nothing - Fixture to remain	4
Large Gym Bldg - Elevation - Exterior	1L, 70W, HPS, surface mounted wall pack with magnetic ballast	1	1L, 25W, LED (GC #97973), surface mounted wall pack with electronic ballast	1
Elem./Middle School Bldg - Elevation - Cafeteria	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	14	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	14
Elem./Middle School Bldg - Elevation - Kitchen	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	11	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	11
Elem./Middle School Bldg - Elevation - Kitchen	1L, 8.5W, LED, surface mounted exposed with electronic ballast	6	Do nothing - Fixture to remain	6
Elem./Middle School Bldg - Elevation - Kitchen	1L, 8.5W, LED, surface mounted exposed with electronic ballast	2	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast and new dimmer switch	2

Elem./Middle School Bldg - Elevation - Kitchen RR	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Install new wall-mounted occupancy sensor to reduce fixture burn hours.	1
Elem./Middle School Bldg - Elevation - Corridor	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	59	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	59
Elem./Middle School Bldg - Elevation - Corridor	1L, 8.5W, LED, surface mounted exposed with electronic ballast	3	Install new wireless ceiling occupancy sensor to reduce fixture burn hours.	3
Elem./Middle School Bldg - Elevation - Corridor	1L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 14W, TLED (GC #35655), surface mounted 1x4 strip with electronic ballast	1
Elem./Middle School Bldg - Elevation - Women's RR #1	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	3
Elem./Middle School Bldg - Elevation - Men's RR #1	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	4
Elem./Middle School Bldg - Elevation - Room #15	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #16	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #17	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Women's RR #2	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	2
Elem./Middle School Bldg - Elevation - Men's RR #2	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	2
Elem./Middle School Bldg - Elevation - Elec. Closet #1	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Do nothing - Fixture to remain	1
Elem./Middle School Bldg - Elevation - Storage Closet	1L, 8.5W, LED, surface mounted exposed with electronic ballast	1	Install new wall-mounted occupancy sensor to reduce fixture burn hours.	1
Elem./Middle School Bldg - Elevation - Room #18	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #19	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #20	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8

Elem./Middle School Bldg - Elevation - Women's RR #3	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	3
Elem./Middle School Bldg - Elevation - Men's RR #3	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	3
Elem./Middle School Bldg - Elevation - Elec. Closet #2	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	2	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast	2
Elem./Middle School Bldg - Elevation - Room #25	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #26	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #27	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #28	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #31	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #32	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #33	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #34	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #35	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #36	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Nurse Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	3

Elem./Middle School Bldg - Elevation - Elem. Principle's Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	4
Elem./Middle School Bldg - Elevation - Teacher's Lounge	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	4
Elem./Middle School Bldg - Elevation - Teacher's Lounge RR	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	1	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	1
Elem./Middle School Bldg - Elevation - Teacher's Lounge RR	2L, 60W, incandescent, surface mounted exposed with ballast	1	1L, 11W, LED (Lithonia CLX-L24-1500LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x2 strip with electronic ballast	1
Elem./Middle School Bldg - Elevation - Room #13	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #11	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #10	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #7	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #7	1L, 8.5W, LED, lamp mounted exposed with electronic ballast	1	Do nothing - Fixture to remain	1
Elem./Middle School Bldg - Elevation - Maint. Room	1L, 8.5W, LED, surface mounted exposed with electronic ballast	2	Do nothing - Fixture to remain	2
Elem./Middle School Bldg - Elevation - Room #4	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
Elem./Middle School Bldg - Elevation - Special Ed. Room	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	3
Elem./Middle School Bldg - Elevation - Room #37	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - I.T. Closet	4L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 50W, LED (GE RLB2-R4-0-70-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	1
Elem./Middle School Bldg - Elevation - I.T. Closet	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 50W, LED (GE RLB2-R4-0-70-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast	1

Elem./Middle School Bldg - Elevation - Room #38	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	4
Elem./Middle School Bldg - Elevation - Room #39	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #40	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #41	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
Elem./Middle School Bldg - Elevation - Room #41	1L, 13W, CFL, lamp mounted exposed with electronic ballast	1	1L, 9W, LED (GC #58039), lamp mounted exposed with electronic ballast	1
Elem./Middle School Bldg - Elevation - Room #42	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #43	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	10	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	10
Elem./Middle School Bldg - Elevation - Room #43	1L, 60W, incandescent, lamp mounted exposed with ballast	1	1L, 9W, LED (GC #58037), lamp mounted exposed with electronic ballast	1
Elem./Middle School Bldg - Elevation - Room #44	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Room #45	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	8	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	8
Elem./Middle School Bldg - Elevation - Counselor's Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	4
Elem./Middle School Bldg - Elevation - Counselor's Office	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	1
Elem./Middle School Bldg - Elevation - Main Office	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	2
Elem./Middle School Bldg - Elevation - Main Office	1L, 8.5W, LED, surface mounted exposed with electronic ballast	3	Do nothing - Fixture to remain	3
Elem./Middle School Bldg - Elevation - Main Office	1L, 23W, BR CFL, surface mounted exposed with electronic ballast	1	1L, 15W, LED (GC #98146), surface mounted exposed with electronic ballast	1

Elem./Middle School Bldg - Elevation - Room A	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	2	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast and new dimmer switch	2
Elem./Middle School Bldg - Elevation - Exterior	1L, 28W, LED, surface mounted wall pack with electronic ballast	3	Do nothing - Fixture to remain	3
Elem./Middle School Bldg - Elevation - Exterior	1L, 7W, LED, surface mounted wall pack with electronic ballast	2	Do nothing - Fixture to remain	2
Elem./Middle School Bldg - Elevation - Exterior	1L, 70W, HPS, surface mounted wall pack with magnetic ballast	7	1L, 25W, LED (GC #97973), surface mounted wall pack with electronic ballast	7
Small Gym Bldg - Elevation - Gym/Stage	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	38	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast and new dimmer switch	38
Small Gym Bldg - Elevation - Gym	5L, 54W, T5HO, pendent mounted 2x4 high bay with electronic ballast	12	1L, 109W, LED (GE ABV3-0-18-T-48-1D-DF-ST-K-Q-W), pendent mounted 2x4 high bay with electronic ballast and new dimmer switch	12
Small Gym Bldg - Elevation - Corridor	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	4	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	4
Small Gym Bldg - Elevation - Men's RR	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	3
Small Gym Bldg - Elevation - Women's RR	2L, 32W, T8, recessed 2x4 troffer with electronic ballast	3	1L, 32W, LED (GE PVR-24-A-0-4/4400-MM-8/4000-TT-RM-WHTE), recessed 2x4 troffer with electronic ballast	3
Small Gym Bldg - Elevation - Women's RR	2L, 32W, T8, surface mounted 1x4 vaportite with electronic ballast	1	1L, 35W, LED (Lithonia CLX-L48-5000LM-SEF-RDL-MVOLT-EZ1-40K-80CRI-NLTAIR2 RES7PDT-WH), surface mounted 1x4 strip with electronic ballast	1
Small Gym Bldg - Elevation - Closet	2L, 32W, T8, surface mounted 1x4 strip with electronic ballast	1	1L, 34W, LED (GE RLB2-R4-0-50-V1-840-TT-RM-WHTE), surface mounted 1x4 strip with electronic ballast	1
Small Gym Bldg - Elevation - Exterior	1L, 15W, LED, surface mounted canopy with electronic ballast	2	Do nothing - Fixture to remain	2
Small Gym Bldg - Elevation - Exterior	1L, 70W, HPS, surface mounted wall pack with magnetic ballast	4	1L, 25W, LED (GC #97973), surface mounted wall pack with electronic ballast	4
Site - Elevation - Exterior	1L, 150W, HPS, pole mounted area light with magnetic ballast	13	1L, 122W, LED (GE EACL-01-0-F4-AF-7-40-X-E-C1-GRAY), pole mounted area light with electronic ballast	13
Site - Elevation - Exterior	1L, 400W, HPS, pole mounted area light with magnetic ballast	7	1L, 122W, LED (GE EACL-01-0-F4-AF-7-40-X-E-C1-GRAY), pole mounted area light with electronic ballast	7
All Bldgs - Elevation - Interior	1L, 2W, CFL, surface mounted egress with electronic ballast	15	1L, 2W, LED battery, surface mounted egress with electronic ballast	131
All Bldgs - Elevation - Interior	1L, 8W, CFL, surface mounted exit with electronic ballast	20	1L, 2.5W, LED (Lightalarms QLXN500-RN), surface mounted exit with electronic ballast	35
All Bldgs - Elevation - Exterior	1L, 2W, CFL, surface mounted egress with electronic ballast	2	1L, 2W, LED (Mule EAE-BB-10-DB-W), surface mounted egress with electronic ballast	35

2.2 Lighting Controls

Affected School Rooms
Entire School

Existing Conditions
Currently there are no use of lighting controls, either externally to or integral to any lighting fixture found within H W Byers.

Upgrade Recommendation
Following energy code, as defined in ASHRAE 2013, it is recommended to install occupancy sensors, lighting fixture dimmers, and daylight sensors across all areas of the school in various combinations depending on area. The overall implementation is to reduce burn hours of fixtures and kWh used. A majority of the associated sensors needed to outfit the school are integral to the selections made to replace the current lighting fixtures.

Quality of Life Implications
This is purely an energy saving measure which will allow for significant kWh savings which in turn equates to a substantial reduction in maintenance costs. The maintenance staff will notice there will be a lower frequency of lamp and ballast replacements.

Refer to the control specifications contained in section 2.1 Lighting Upgrades

2.3 Install Window Film

Affected School Rooms
All

Existing Conditions
The current windows are in good condition but still allow for significant solar heat gain to the spaces.

Upgrade Recommendation
Window films are available to reduce solar gain as well as add insulation to reduce heat gain and loss via conduction. One example of this product is 3M All Season Window Film. Due to the solar heat gain being beneficial during the heating season there is an increased energy use required due to the loss of solar heat gain. The increased insulation properties of this product help to offset that. Unfortunately, due to the high cost of the propane utilized for heating at this location, this change would cause an increase in yearly utility costs.

Quality of Life Implications

This change would also reduce glare for the occupants which can provide for improved student outcomes.

Specifications

2.3 Install Window Film

Cooling - Conduction

Existing Cooling Conduction:

Fulton @ Outside Temp: 107	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	107 °F - 73 °F	x	0.00%	Bin hours @ Temp	= 0 Btu/hr
Fulton @ Outside Temp: 107	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	107 °F - 90 °F	x	0.00%	Bin hours @ Temp	= 0 Btu/hr
Fulton @ Outside Temp: 102	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	102 °F - 73 °F	x	0.08%	Bin hours @ Temp	= 46 Btu/hr
Fulton @ Outside Temp: 102	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	102 °F - 90 °F	x	0.01%	Bin hours @ Temp	= 3 Btu/hr
Fulton @ Outside Temp: 97	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	97 °F - 73 °F	x	0.74%	Bin hours @ Temp	= 352 Btu/hr
Fulton @ Outside Temp: 97	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	97 °F - 90 °F	x	0.17%	Bin hours @ Temp	= 24 Btu/hr
Fulton @ Outside Temp: 92	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	92 °F - 73 °F	x	2.34%	Bin hours @ Temp	= 878 Btu/hr
Fulton @ Outside Temp: 92	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	92 °F - 90 °F	x	0.69%	Bin hours @ Temp	= 27 Btu/hr
Fulton @ Outside Temp: 87	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	87 °F - 73 °F	x	3.51%	Bin hours @ Temp	= 969 Btu/hr
Fulton @ Outside Temp: 87	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	87 °F - 90 °F	x	1.78%	Bin hours @ Temp	= 106 Btu/hr
Fulton @ Outside Temp: 82	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	82 °F - 73 °F	x	3.67%	Bin hours @ Temp	= 651 Btu/hr
Fulton @ Outside Temp: 82	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	82 °F - 90 °F	x	3.94%	Bin hours @ Temp	= 622 Btu/hr
Fulton @ Outside Temp: 77	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	77 °F - 73 °F	x	3.28%	Bin hours @ Temp	= 259 Btu/hr
Fulton @ Outside Temp: 77	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	77 °F - 90 °F	x	7.31%	Bin hours @ Temp	= 1,873 Btu/hr
Fulton @ Outside Temp: 72	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	72 °F - 73 °F	x	2.94%	Bin hours @ Temp	= 58 Btu/hr
Fulton @ Outside Temp: 72	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	72 °F - 90 °F	x	8.14%	Bin hours @ Temp	= 2,889 Btu/hr
Fulton @ Outside Temp: 67	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	67 °F - 73 °F	x	2.72%	Bin hours @ Temp	= 322 Btu/hr
Fulton @ Outside Temp: 67	131	glass windows	x	14.07	ft²	x	1.07	U-value	x	67 °F - 90 °F	x	6.75%	Bin hours @ Temp	= 3,059 Btu/hr
Total Existing Cooling Conduction:														= 12,136 Btu/hr

Recommended Cooling Conduction:

Fulton @ Outside Temp: 107	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	107 °F - 73 °F	x	0.00%	Bin hours @ Temp	= 0 Btu/hr
Fulton @ Outside Temp: 107	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	107 °F - 90 °F	x	0.00%	Bin hours @ Temp	= 0 Btu/hr
Fulton @ Outside Temp: 102	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	102 °F - 73 °F	x	0.08%	Bin hours @ Temp	= 33 Btu/hr
Fulton @ Outside Temp: 102	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	102 °F - 90 °F	x	0.01%	Bin hours @ Temp	= 2 Btu/hr
Fulton @ Outside Temp: 97	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	97 °F - 73 °F	x	0.74%	Bin hours @ Temp	= 253 Btu/hr
Fulton @ Outside Temp: 97	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	97 °F - 90 °F	x	0.17%	Bin hours @ Temp	= 17 Btu/hr
Fulton @ Outside Temp: 92	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	92 °F - 73 °F	x	2.34%	Bin hours @ Temp	= 632 Btu/hr
Fulton @ Outside Temp: 92	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	92 °F - 90 °F	x	0.69%	Bin hours @ Temp	= 19 Btu/hr
Fulton @ Outside Temp: 87	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	87 °F - 73 °F	x	3.51%	Bin hours @ Temp	= 697 Btu/hr
Fulton @ Outside Temp: 87	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	87 °F - 90 °F	x	1.78%	Bin hours @ Temp	= 76 Btu/hr
Fulton @ Outside Temp: 82	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	82 °F - 73 °F	x	3.67%	Bin hours @ Temp	= 469 Btu/hr
Fulton @ Outside Temp: 82	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	82 °F - 90 °F	x	3.94%	Bin hours @ Temp	= 448 Btu/hr
Fulton @ Outside Temp: 77	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	77 °F - 73 °F	x	3.28%	Bin hours @ Temp	= 186 Btu/hr
Fulton @ Outside Temp: 77	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	77 °F - 90 °F	x	7.31%	Bin hours @ Temp	= 1,348 Btu/hr
Fulton @ Outside Temp: 72	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	72 °F - 73 °F	x	2.94%	Bin hours @ Temp	= 42 Btu/hr
Fulton @ Outside Temp: 72	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	72 °F - 90 °F	x	8.14%	Bin hours @ Temp	= 2,079 Btu/hr
Fulton @ Outside Temp: 67	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	67 °F - 73 °F	x	2.72%	Bin hours @ Temp	= 232 Btu/hr
Fulton @ Outside Temp: 67	131	glass windows	x	14.07	ft²	x	0.77	U-value	x	67 °F - 90 °F	x	6.75%	Bin hours @ Temp	= 2,201 Btu/hr
Total Existing Cooling Conduction:														= 8,734 Btu/hr
Total Cooling Conduction Savings:														= 3,403 Btu/hr

2.3 Install Window Film Continued

Cooling - Solar

Existing Cooling Solar:

High	E	3	Window	Type 1	x	6.3	ft^2	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 5,397 Btu/hr
ELEM/MIDDLE	N	5	Window	Type 2	x	13.3	ft^3	x	0.57	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 6,408 Btu/hr
GYM/VOTECH	N	4	Window	Type 3	x	19.1	ft^4	x	0.57	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 7,348 Btu/hr
High	E	4	Window	Type 4	x	13.3	ft^5	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 15,304 Btu/hr
High	W	4	Window	Type 4	x	13.3	ft^6	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 15,304 Btu/hr
GYM/VOTECH	E	3	Window	Type 4	x	13.3	ft^7	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 11,478 Btu/hr
ELEM/MIDDLE	S	10	Window	Type 5	x	13.8	ft^8	x	0.57	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 30,811 Btu/hr
ELEM/MIDDLE	SSW	16	Window	Type 5	x	13.8	ft^9	x	0.57	Shading $_{Coefficient}$	x	481	Avg. Solar HG $_{Factor}$	= 60,357 Btu/hr
ELEM/MIDDLE	W	13	Window	Type 5	x	13.8	ft^{10}	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 51,453 Btu/hr
ELEM/MIDDLE	E	8	Window	Type 5	x	13.8	ft^{11}	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 31,664 Btu/hr
ELEM/MIDDLE	N	4	Window	Type 5	x	13.8	ft^{12}	x	0.57	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 5,286 Btu/hr
ELEM/MIDDLE	NE	16	Window	Type 5	x	13.8	ft^{13}	x	0.57	Shading $_{Coefficient}$	x	317	Avg. Solar HG $_{Factor}$	= 39,767 Btu/hr
GYM/VOTECH	S	4	Window	Type 6	x	12.7	ft^{14}	x	0.57	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 11,353 Btu/hr
GYM/VOTECH	S	9	Window	Type 7	x	12.8	ft^{15}	x	0.57	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 25,769 Btu/hr
High	S	14	Window	Type 8	x	16.7	ft^{16}	x	0.57	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 52,286 Btu/hr
High	E	2	Window	Type 8	x	16.7	ft^{17}	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 9,595 Btu/hr
ELEM/MIDDLE	SSW	4	Window	Type 9	x	8.5	ft^{18}	x	0.57	Shading $_{Coefficient}$	x	481	Avg. Solar HG $_{Factor}$	= 9,282 Btu/hr
ELEM/MIDDLE	W	2	Window	Type 9	x	8.5	ft^{19}	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 4,869 Btu/hr
ELEM/MIDDLE	N	2	Window	Type 9	x	8.5	ft^{20}	x	0.57	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 1,626 Btu/hr
High	W	4	Window	Type 10	x	28.3	ft^{21}	x	0.57	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 32,623 Btu/hr
Total Existing Cooling Solar Load:														= 427,981 Btu/hr

Recommended Cooling Solar:

High	E	3	Window	Type 1	x	6.3	ft^2	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 2,273 Btu/hr
ELEM/MIDDLE	N	5	Window	Type 2	x	13.3	ft^3	x	0.24	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 2,698 Btu/hr
GYM/VOTECH	N	4	Window	Type 3	x	19.1	ft^4	x	0.24	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 3,094 Btu/hr
High	E	4	Window	Type 4	x	13.3	ft^5	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 6,444 Btu/hr
High	W	4	Window	Type 4	x	13.3	ft^6	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 6,444 Btu/hr
GYM/VOTECH	E	3	Window	Type 4	x	13.3	ft^7	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 4,833 Btu/hr
ELEM/MIDDLE	S	10	Window	Type 5	x	13.8	ft^8	x	0.24	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 12,973 Btu/hr
ELEM/MIDDLE	SSW	16	Window	Type 5	x	13.8	ft^9	x	0.24	Shading $_{Coefficient}$	x	481	Avg. Solar HG $_{Factor}$	= 25,413 Btu/hr
ELEM/MIDDLE	W	13	Window	Type 5	x	13.8	ft^{10}	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 21,665 Btu/hr
ELEM/MIDDLE	E	8	Window	Type 5	x	13.8	ft^{11}	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 13,332 Btu/hr
ELEM/MIDDLE	N	4	Window	Type 5	x	13.8	ft^{12}	x	0.24	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 2,226 Btu/hr
ELEM/MIDDLE	NE	16	Window	Type 5	x	13.8	ft^{13}	x	0.24	Shading $_{Coefficient}$	x	317	Avg. Solar HG $_{Factor}$	= 16,744 Btu/hr
GYM/VOTECH	S	4	Window	Type 6	x	12.7	ft^{14}	x	0.24	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 4,780 Btu/hr
GYM/VOTECH	S	9	Window	Type 7	x	12.8	ft^{15}	x	0.24	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 10,850 Btu/hr
High	S	14	Window	Type 8	x	16.7	ft^{16}	x	0.24	Shading $_{Coefficient}$	x	393	Avg. Solar HG $_{Factor}$	= 22,015 Btu/hr
High	E	2	Window	Type 8	x	16.7	ft^{17}	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 4,040 Btu/hr
ELEM/MIDDLE	SSW	4	Window	Type 9	x	8.5	ft^{18}	x	0.24	Shading $_{Coefficient}$	x	481	Avg. Solar HG $_{Factor}$	= 3,908 Btu/hr
ELEM/MIDDLE	W	2	Window	Type 9	x	8.5	ft^{19}	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 2,050 Btu/hr
ELEM/MIDDLE	N	2	Window	Type 9	x	8.5	ft^{20}	x	0.24	Shading $_{Coefficient}$	x	169	Avg. Solar HG $_{Factor}$	= 685 Btu/hr
High	W	4	Window	Type 10	x	28.3	ft^{21}	x	0.24	Shading $_{Coefficient}$	x	505	Avg. Solar HG $_{Factor}$	= 13,736 Btu/hr
Total Recommended Cooling Solar Load:														= 180,202 Btu/hr
Total Cooling Conduction Load Reduction:														= 247,778 Btu/hr

Cooling Savings:

Existing Cooling Electrical Consumption:

Fulton	440,117 Btu/hr	÷	12,000 Btu/Ton	x	1.0 kW/ton	x	876 FLH	= 32,249 kWh/yr
Total Existing Electrical Consumption:								= 32,249 kWh/yr

Recommended Cooling Electrical Consumption:

Fulton	188,936 Btu/hr	÷	12,000 Btu/Ton	x	1.0 kW/ton	x	876 FLH	= 13,844 kWh/yr
Total Recommended Cooling Electrical Consumption:								= 13,844 kWh/yr
Total Cooling Electrical Consumption Savings:								= 18,405 kWh/yr

Cooling - Electrical Demand

Existing Cooling Electrical Demand:

Fulton	440,117 Btu/hr	÷	12,000 Btu/Ton	x	1.0 kW/ton	x	80% Demand Div.	= 29.46 kW/mo
Total Existing Cooling Electrical Demand:								= 29.46 kW/mo

Recommended Cooling Electrical Demand:

Fulton	188,936 Btu/hr	÷	12,000 Btu/Ton	x	1.0 kW/ton	x	80% Demand Div.	= 12.65 kW/mo
Total Recommended Cooling Electrical Demand:								= 12.65 kW/mo
Total Cooling Electrical Demand Savings:								= 17 kW/mo
Assumes 7 months per year usage:								
Annual Electric Demand Savings:								= 101 kW/yr

2.3 Install Window Film Continued

Heating -Conduction

Existing Heating Conduction:

Fulton @ Outside Temp: 62	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	62	°F	-	70	°F	x	2.60%	Bin hours @ Temp	=	421	Btu/h
Fulton @ Outside Temp: 62	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	62	°F	-	55	°F	x	6.00%	Bin hours @ Temp	=	852	Btu/h
Fulton @ Outside Temp: 57	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	57	°F	-	70	°F	x	2.31%	Bin hours @ Temp	=	609	Btu/h
Fulton @ Outside Temp: 57	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	57	°F	-	55	°F	x	5.59%	Bin hours @ Temp	=	227	Btu/h
Fulton @ Outside Temp: 52	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	52	°F	-	70	°F	x	2.14%	Bin hours @ Temp	=	780	Btu/h
Fulton @ Outside Temp: 52	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	52	°F	-	55	°F	x	5.04%	Bin hours @ Temp	=	307	Btu/h
Fulton @ Outside Temp: 47	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	47	°F	-	70	°F	x	1.98%	Bin hours @ Temp	=	922	Btu/h
Fulton @ Outside Temp: 47	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	47	°F	-	55	°F	x	4.87%	Bin hours @ Temp	=	790	Btu/h
Fulton @ Outside Temp: 42	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	42	°F	-	70	°F	x	1.77%	Bin hours @ Temp	=	1,006	Btu/h
Fulton @ Outside Temp: 42	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	42	°F	-	55	°F	x	4.91%	Bin hours @ Temp	=	1,292	Btu/h
Fulton @ Outside Temp: 37	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	37	°F	-	70	°F	x	1.39%	Bin hours @ Temp	=	933	Btu/h
Fulton @ Outside Temp: 37	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	37	°F	-	55	°F	x	4.20%	Bin hours @ Temp	=	1,531	Btu/h
Fulton @ Outside Temp: 32	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	32	°F	-	70	°F	x	0.95%	Bin hours @ Temp	=	731	Btu/h
Fulton @ Outside Temp: 32	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	32	°F	-	55	°F	x	3.36%	Bin hours @ Temp	=	1,567	Btu/h
Fulton @ Outside Temp: 27	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	27	°F	-	70	°F	x	0.53%	Bin hours @ Temp	=	458	Btu/h
Fulton @ Outside Temp: 27	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	27	°F	-	55	°F	x	1.90%	Bin hours @ Temp	=	1,077	Btu/h
Fulton @ Outside Temp: 22	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	22	°F	-	70	°F	x	0.30%	Bin hours @ Temp	=	289	Btu/h
Fulton @ Outside Temp: 22	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	22	°F	-	55	°F	x	1.02%	Bin hours @ Temp	=	681	Btu/h
Fulton @ Outside Temp: 17	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	17	°F	-	70	°F	x	0.14%	Bin hours @ Temp	=	147	Btu/h
Fulton @ Outside Temp: 17	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	17	°F	-	55	°F	x	0.50%	Bin hours @ Temp	=	387	Btu/h
Fulton @ Outside Temp: 12	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	12	°F	-	70	°F	x	0.05%	Bin hours @ Temp	=	54	Btu/h
Fulton @ Outside Temp: 12	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	12	°F	-	55	°F	x	0.19%	Bin hours @ Temp	=	169	Btu/h
Fulton @ Outside Temp: 7	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	7	°F	-	70	°F	x	0.02%	Bin hours @ Temp	=	29	Btu/h
Fulton @ Outside Temp: 7	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	7	°F	-	55	°F	x	0.11%	Bin hours @ Temp	=	111	Btu/h
Fulton @ Outside Temp: 2	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	2	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: 2	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	2	°F	-	55	°F	x	0.05%	Bin hours @ Temp	=	49	Btu/h
Fulton @ Outside Temp: -3	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-3	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -3	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-3	°F	-	55	°F	x	0.01%	Bin hours @ Temp	=	13	Btu/h
Fulton @ Outside Temp: -8	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-8	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -8	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-8	°F	-	55	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -13	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-13	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -13	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-13	°F	-	55	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -18	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-18	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -18	131	glass windows	x	14.07	ft²	x	1.10	U-value	x	-13	°F	-	55	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Total Existing Heating Conduction:																		=	15,433	Btu/h

Recommended Heating Conduction:

Fulton @ Outside Temp: 62	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	62	°F	-	70	°F	x	2.60%	Bin hours @ Temp	=	295	Btu/h
Fulton @ Outside Temp: 62	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	62	°F	-	55	°F	x	6.00%	Bin hours @ Temp	=	596	Btu/h
Fulton @ Outside Temp: 57	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	57	°F	-	70	°F	x	2.31%	Bin hours @ Temp	=	426	Btu/h
Fulton @ Outside Temp: 57	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	57	°F	-	55	°F	x	5.59%	Bin hours @ Temp	=	159	Btu/h
Fulton @ Outside Temp: 52	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	52	°F	-	70	°F	x	2.14%	Bin hours @ Temp	=	546	Btu/h
Fulton @ Outside Temp: 52	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	52	°F	-	55	°F	x	5.04%	Bin hours @ Temp	=	215	Btu/h
Fulton @ Outside Temp: 47	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	47	°F	-	70	°F	x	1.98%	Bin hours @ Temp	=	646	Btu/h
Fulton @ Outside Temp: 47	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	47	°F	-	55	°F	x	4.87%	Bin hours @ Temp	=	553	Btu/h
Fulton @ Outside Temp: 42	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	42	°F	-	70	°F	x	1.77%	Bin hours @ Temp	=	704	Btu/h
Fulton @ Outside Temp: 42	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	42	°F	-	55	°F	x	4.91%	Bin hours @ Temp	=	905	Btu/h
Fulton @ Outside Temp: 37	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	37	°F	-	70	°F	x	1.39%	Bin hours @ Temp	=	653	Btu/h
Fulton @ Outside Temp: 37	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	37	°F	-	55	°F	x	4.20%	Bin hours @ Temp	=	1,072	Btu/h
Fulton @ Outside Temp: 32	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	32	°F	-	70	°F	x	0.95%	Bin hours @ Temp	=	512	Btu/h
Fulton @ Outside Temp: 32	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	32	°F	-	55	°F	x	3.36%	Bin hours @ Temp	=	1,097	Btu/h
Fulton @ Outside Temp: 27	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	27	°F	-	70	°F	x	0.53%	Bin hours @ Temp	=	321	Btu/h
Fulton @ Outside Temp: 27	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	27	°F	-	55	°F	x	1.90%	Bin hours @ Temp	=	754	Btu/h
Fulton @ Outside Temp: 22	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	22	°F	-	70	°F	x	0.30%	Bin hours @ Temp	=	202	Btu/h
Fulton @ Outside Temp: 22	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	22	°F	-	55	°F	x	1.02%	Bin hours @ Temp	=	476	Btu/h
Fulton @ Outside Temp: 17	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	17	°F	-	70	°F	x	0.14%	Bin hours @ Temp	=	103	Btu/h
Fulton @ Outside Temp: 17	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	17	°F	-	55	°F	x	0.50%	Bin hours @ Temp	=	271	Btu/h
Fulton @ Outside Temp: 12	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	12	°F	-	70	°F	x	0.05%	Bin hours @ Temp	=	38	Btu/h
Fulton @ Outside Temp: 12	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	12	°F	-	55	°F	x	0.19%	Bin hours @ Temp	=	119	Btu/h
Fulton @ Outside Temp: 7	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	7	°F	-	70	°F	x	0.02%	Bin hours @ Temp	=	20	Btu/h
Fulton @ Outside Temp: 7	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	7	°F	-	55	°F	x	0.11%	Bin hours @ Temp	=	78	Btu/h
Fulton @ Outside Temp: 2	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	2	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: 2	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	2	°F	-	55	°F	x	0.05%	Bin hours @ Temp	=	34	Btu/h
Fulton @ Outside Temp: -3	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-3	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -3	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-3	°F	-	55	°F	x	0.01%	Bin hours @ Temp	=	9	Btu/h
Fulton @ Outside Temp: -8	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-8	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -8	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-8	°F	-	55	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -13	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-13	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -13	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-13	°F	-	55	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -18	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-18	°F	-	70	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Fulton @ Outside Temp: -18	131	glass windows	x	14.1	ft²	x	0.77	U-value	x	-13	°F	-	55	°F	x	0.00%	Bin hours @ Temp	=	0	Btu/h
Total Existing Heating Conduction:																		=	10,803	Btu/h
Total Heating Conduction Savings:																		=	4,630	Btu/h

2.3 Install Window Film Continued

Heating - Solar

Existing Heating Solar:

High	E	3	Window Type 1	x	6.3	ft²	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	4,083 Btu/hr
ELEM/MIDDLE	N	5	Window Type 2	x	13.3	ft³	x	0.57	Shading Coefficient	x	94	Avg. Solar HG Factor	=	3,553 Btu/hr
GYM/VOTECH	N	4	Window Type 3	x	19.1	ft⁴	x	0.57	Shading Coefficient	x	94	Avg. Solar HG Factor	=	4,074 Btu/hr
High	E	4	Window Type 4	x	13.3	ft⁵	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	11,577 Btu/hr
High	W	4	Window Type 4	x	13.3	ft⁶	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	11,577 Btu/hr
GYM/VOTECH	E	3	Window Type 4	x	13.3	ft⁷	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	8,682 Btu/hr
ELEM/MIDDLE	S	10	Window Type 5	x	13.8	ft⁸	x	0.57	Shading Coefficient	x	769	Avg. Solar HG Factor	=	60,231 Btu/hr
ELEM/MIDDLE	SSW	16	Window Type 5	x	13.8	ft⁹	x	0.57	Shading Coefficient	x	726	Avg. Solar HG Factor	=	91,025 Btu/hr
ELEM/MIDDLE	W	13	Window Type 5	x	13.8	ft¹⁰	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	38,921 Btu/hr
ELEM/MIDDLE	E	8	Window Type 5	x	13.8	ft¹¹	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	23,951 Btu/hr
ELEM/MIDDLE	N	4	Window Type 5	x	13.8	ft¹²	x	0.57	Shading Coefficient	x	94	Avg. Solar HG Factor	=	2,931 Btu/hr
ELEM/MIDDLE	NE	16	Window Type 5	x	13.8	ft¹³	x	0.57	Shading Coefficient	x	141	Avg. Solar HG Factor	=	17,634 Btu/hr
GYM/VOTECH	S	4	Window Type 6	x	12.7	ft¹⁴	x	0.57	Shading Coefficient	x	769	Avg. Solar HG Factor	=	22,194 Btu/hr
GYM/VOTECH	S	9	Window Type 7	x	12.8	ft¹⁵	x	0.57	Shading Coefficient	x	769	Avg. Solar HG Factor	=	50,375 Btu/hr
High	S	14	Window Type 8	x	16.7	ft¹⁶	x	0.57	Shading Coefficient	x	769	Avg. Solar HG Factor	=	102,211 Btu/hr
High	E	2	Window Type 8	x	16.7	ft¹⁷	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	7,258 Btu/hr
ELEM/MIDDLE	SSW	4	Window Type 9	x	8.5	ft¹⁸	x	0.57	Shading Coefficient	x	726	Avg. Solar HG Factor	=	13,998 Btu/hr
ELEM/MIDDLE	W	2	Window Type 9	x	8.5	ft¹⁹	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	3,683 Btu/hr
ELEM/MIDDLE	N	2	Window Type 9	x	8.5	ft²⁰	x	0.57	Shading Coefficient	x	94	Avg. Solar HG Factor	=	902 Btu/hr
High	W	4	Window Type 10	x	28.3	ft²¹	x	0.57	Shading Coefficient	x	382	Avg. Solar HG Factor	=	24,677 Btu/hr
Total Existing Heating Solar Load:													=	503,538 Btu/hr

Recommended Cooling Solar:

High	E	3	Window Type 1	x	6.3	ft²	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	1,719 Btu/hr
ELEM/MIDDLE	N	5	Window Type 2	x	13.3	ft³	x	0.24	Shading Coefficient	x	94	Avg. Solar HG Factor	=	1,496 Btu/hr
GYM/VOTECH	N	4	Window Type 3	x	19.1	ft⁴	x	0.24	Shading Coefficient	x	94	Avg. Solar HG Factor	=	1,715 Btu/hr
High	E	4	Window Type 4	x	13.3	ft⁵	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	4,874 Btu/hr
High	W	4	Window Type 4	x	13.3	ft⁶	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	4,874 Btu/hr
GYM/VOTECH	E	3	Window Type 4	x	13.3	ft⁷	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	3,656 Btu/hr
ELEM/MIDDLE	S	10	Window Type 5	x	13.8	ft⁸	x	0.24	Shading Coefficient	x	769	Avg. Solar HG Factor	=	25,361 Btu/hr
ELEM/MIDDLE	SSW	16	Window Type 5	x	13.8	ft⁹	x	0.24	Shading Coefficient	x	726	Avg. Solar HG Factor	=	38,326 Btu/hr
ELEM/MIDDLE	W	13	Window Type 5	x	13.8	ft¹⁰	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	16,388 Btu/hr
ELEM/MIDDLE	E	8	Window Type 5	x	13.8	ft¹¹	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	10,085 Btu/hr
ELEM/MIDDLE	N	4	Window Type 5	x	13.8	ft¹²	x	0.24	Shading Coefficient	x	94	Avg. Solar HG Factor	=	1,234 Btu/hr
ELEM/MIDDLE	NE	16	Window Type 5	x	13.8	ft¹³	x	0.24	Shading Coefficient	x	141	Avg. Solar HG Factor	=	7,425 Btu/hr
GYM/VOTECH	S	4	Window Type 6	x	12.7	ft¹⁴	x	0.24	Shading Coefficient	x	769	Avg. Solar HG Factor	=	9,345 Btu/hr
GYM/VOTECH	S	9	Window Type 7	x	12.8	ft¹⁵	x	0.24	Shading Coefficient	x	769	Avg. Solar HG Factor	=	21,211 Btu/hr
High	S	14	Window Type 8	x	16.7	ft¹⁶	x	0.24	Shading Coefficient	x	769	Avg. Solar HG Factor	=	43,036 Btu/hr
High	E	2	Window Type 8	x	16.7	ft¹⁷	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	3,056 Btu/hr
ELEM/MIDDLE	SSW	4	Window Type 9	x	8.5	ft¹⁸	x	0.24	Shading Coefficient	x	726	Avg. Solar HG Factor	=	5,894 Btu/hr
ELEM/MIDDLE	W	2	Window Type 9	x	8.5	ft¹⁹	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	1,551 Btu/hr
ELEM/MIDDLE	N	2	Window Type 9	x	8.5	ft²⁰	x	0.24	Shading Coefficient	x	94	Avg. Solar HG Factor	=	380 Btu/hr
High	W	4	Window Type 10	x	28.3	ft²¹	x	0.24	Shading Coefficient	x	382	Avg. Solar HG Factor	=	10,390 Btu/hr
Total Recommended Heating Solar Load:													=	212,016 Btu/hr
Total Heating Conduction Load Reduction:													=	291,522 Btu/hr

Heating - Natural Gas Consumption

Existing Natural Gas Consumption:

Fulton	-488,104	Btu/hr	÷	68	°F	x	67,714	hr-°F	÷	80%	Comb.eff.	÷	91,500 Btu/GAL	= -6,640 Gal/yr
Total Existing Natural Gas Consumption:													=	-6,640 Gal/yr

Recommended Heating Natural Gas Consumption:

Fulton	-201,213	Btu/hr	÷	68	°F	x	67,714	hr-°F	÷	80%	Comb.eff.	÷	91,500 Btu/GAL	= -2,737 Gal/yr
Total Recommended Natural Gas Consumption:													=	-2,737 Gal/yr
Total Heating Natural Gas Consumption Savings:														-3,903 Gal/yr

2.4 Computer Plug Loads – Management Software

Affected School Rooms
Classrooms

Existing Conditions
Desktop computers in classrooms remain on at all times throughout the school year, some of which not even being put into a low power or sleep mode. The computers stay on most likely due to the age of the hardware and the slow start-up times associated with dated systems running newer programming.

Upgrade Recommendation
It is recommended that the IT department implement the use of software to control the computers to enter a sleep mode at a specified time each day, regardless of processes left open on the device. It is the assumption that the computer management software will force sleep mode on both the computer and monitor. This does not include any assumption of a computer management system on laptops used by the teachers.

Quality of Life Implications
This is purely an energy saving measure.

Specifications

TVA EnergyRight COMMUNITY

2.4 Computer Plug Loads

Computer Management (Current Idle Conditions)

Equipment	Qty.	Volts	Watts	kW	Corr. Factor	Adjusted kW	kWh/year	$/year
Computers (Idle)	131	115	100	13.100	1.000	13.100	95,892	$11,834.17
Monitor	131	115	35	4.585	1.000	4.585	33,562	$4,141.96
						Total:	**129,454.2**	**$15,976.13**

Computer Management (Proposed Sleep Conditions)

Equipment	Qty.	Volts	Watts	kW	Corr. Factor	Adjusted kW	kWh/year	$/year
Computers (Idle)	131	115	6	0.786	1.000	0.786	5,754	$710.05
Monitor	131	115	7.5	0.983	1.000	0.983	7,192	$887.56
						Total:	**12,945.4**	**$1,597.61**

Total Savings: 116,508.8 $14,378.52

2.5 Vending Machine Controls

Affected School Rooms
Middle/Elementary Teacher's Lounge, Football Concessions, Basketball Concessions, Cafeteria, High School Main Office, Football Locker Trailer, High School Principal Office

Existing Conditions
Currently one vending machine in the middle/elementary teacher's lounge, one full-size double-door merchandiser in the football concessions, two full-size double-door merchandisers in the basketball concessions, one full-size single-door merchandiser in the cafeteria, one half-size single-door merchandiser in the high school main office, one half-size single-door merchandiser in the football locker trailer, and one half-size single-door merchandiser in the high school principal office are plugged in and running at all times. There are times where the vending machine and merchandisers are not used, and can be shutoff to reduce energy consumption.

Upgrade Recommendation
Install Vending Miser controls on the existing vending machines and merchandisers to turn the machines off during periods of no occupancy. These controls will turn the machines on during unoccupied hours as needed for maintaining the temperature of the contents.

Quality of Life Implications
This is purely an energy saving measure.

Specifications

EnergyRight COMMUNITY

2.5 Vending Machine Controls

Vending Miser Savings

Equipment	Qty.	Volts	Watts	kW	Corr. Factor	Adjusted kW	kWh/year	$/year
Full-Size, Two-Door Glass Merchandisers	3	115	385	1.155	0.250	0.289	1,686	$208.11
Full-Size, One-Door Glass Merchandisers	1	115	265	0.265	0.250	0.066	387	$47.75
Half-Size, One-Door Glass Merchandisers	3	115	165	0.495	0.250	0.124	723	$89.19
Vending Machine	1	115	920	0.920	0.250	0.230	1,343	$165.77
						Total Savings:	**4,139.1**	**$510.81**

2.6 Ice Machine and Refrigerated Cases

Affected School Rooms
Kitchen and Cafeteria

Existing Conditions
Currently there is one ice machine cafeteria that are plugged in throughout the summer and other extended breaks.

Upgrade Recommendation
Initiate a plan that the ice machine shall be unplugged during summer and other extended breaks.

Quality of Life Implications
This is purely an energy saving measure.

Specifications

2.6 Ice Machine & Refrigerated Cases

Ice Machine and Refrigerated Cases Savings

Equipment	Qty.	Volts	Watts	kW	Corr. Factor	Adjusted kW	kWh/year	$/year
Ice Machine	1	115	400	0.400	0.250	0.100	144	$17.77
						Total Savings:	**144**	**$17.77**

2.7 HVAC Controls – Labor Only

Affected School Rooms
All

Existing Conditions
There are many spaces throughout the school that have new programmable thermostats from recent equipment replacements. These thermostats have varying schedules and setpoints. Most of the older units are on a DDC control system that does have occupancy schedules and unoccupied setback. The DDC control system does vary the start time for demand reduction. The DDC control system provides temperature scheduling with occupied setpoints of 73°F cooling and 70°F heating and unoccupied setpoints of 90°F cooling and 55°F heating. The start times for the units are varied in the schedule to reduce demand at the start of occupancy.

Upgrade Recommendation
Standardize the programmable thermostat setpoints and ensure all schedules are accurate for the space. It is recommended that the space setpoints be programmed to match the DDC control system. Those occupied setpoints are 73°F cooling and 70° heating and the unoccupied setpoints are 90°F cooling and 55°F heating. The start times could still be varied similar to the existing DDC control system to reduce demand at morning warm up.

Quality of Life Implications
This is purely an energy saving measure.

Specifications

2.7 HVAC Controls

Cooling - Electrical Consumption

Existing Cooling Electrical Consumption:

GYM LOCKERS	1	Qty	7.5	tons	x	876	FLH	x	1.18	kW/ton	=	7,699 kWh/yr
GYM	2	Qty	40.0	tons	x	876	FLH	x	0.95	kW/ton	=	66,696 kWh/yr
LIBRARY	2	Qty	4.0	tons	x	876	FLH	x	1.00	kW/ton	=	7,006 kWh/yr
ELEM & MIDDLE CLASSROOMS	33	Qty	2.0	tons	x	876	FLH	x	1.00	kW/ton	=	57,799 kWh/yr
ELEM GYM	1	Qty	6.0	tons	x	876	FLH	x	1.10	kW/ton	=	5,780 kWh/yr
ELEM GYM	2	Qty	15.0	tons	x	876	FLH	x	1.09	kW/ton	=	28,637 kWh/yr
Total Existing Cooling Electrical Consumption:											=	173,617 kWh/yr

Recommended Cooling Electrical Consumption:

GYM LOCKERS	1	Qty	7.5	tons	x	800	FLH	x	1.18	kW/ton	=	7,032 kWh/yr
GYM	2	Qty	40.0	tons	x	800	FLH	x	0.95	kW/ton	=	60,919 kWh/yr
LIBRARY	2	Qty	4.0	tons	x	800	FLH	x	1.00	kW/ton	=	6,399 kWh/yr
ELEM & MIDDLE CLASSROOMS	33	Qty	2.0	tons	x	800	FLH	x	1.00	kW/ton	=	52,793 kWh/yr
ELEM GYM	1	Qty	6.0	tons	x	800	FLH	x	1.10	kW/ton	=	5,279 kWh/yr
ELEM GYM	2	Qty	15.0	tons	x	800	FLH	x	1.09	kW/ton	=	26,156 kWh/yr
Total Recommended Cooling Electrical Consumption:											=	158,578 kWh/yr
Total Cooling Electrical Consumption Savings:											=	15,038 kWh/yr

Heating - Natural Gas Consumption

Existing Heating Natural GasConsumption:

GYM LOCKERS	1	Qty	37,250	Btu/hr	÷	72	°F	x	67,714	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	479 Gal/yr
GYM	2	Qty	200,000	Btu/hr	÷	72	°F	x	67,714	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	5,139 Gal/yr
LIBRARY	2	Qty	20,000	Btu/hr	÷	72	°F	x	67,714	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	514 Gal/yr
ELEM & MIDDLE CLASSROOMS	33	Qty	10,000	Btu/hr	÷	72	°F	x	67,714	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	4,240 Gal/yr
ELEM GYM	1	Qty	30,000	Btu/hr	÷	72	°F	x	67,714	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	385 Gal/yr
ELEM GYM	2	Qty	75,000	Btu/hr	÷	72	°F	x	67,714	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	1,927 Gal/yr
Total Existing Heating Natural Gas Consumption:																	=	12,684 Gal/yr

Recommended Natural Gas Consumption:

GYM LOCKERS	1	Qty	37,250	Btu/hr	÷	72	°F	x	45,568	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	322 Gal/yr
GYM	2	Qty	200,000	Btu/hr	÷	72	°F	x	45,568	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	3,458 Gal/yr
LIBRARY	2	Qty	20,000	Btu/hr	÷	72	°F	x	45,568	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	346 Gal/yr
ELEM & MIDDLE CLASSROOMS	33	Qty	10,000	Btu/hr	÷	72	°F	x	45,568	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	2,853 Gal/yr
ELEM GYM	1	Qty	30,000	Btu/hr	÷	72	°F	x	45,568	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	259 Gal/yr
ELEM GYM	2	Qty	75,000	Btu/hr	÷	72	°F	x	45,568	hr-°F	÷	80%	Comb.$_{eff}$	÷	91,500	Btu/GAL	=	1,297 Gal/yr
Total Recommended Heating Natural Gas Consumption Savings:																	=	8,536 Gal/yr
Total Heating Natural Gas Consumption:																	=	4,148 Gal/yr

2.8 Install Door Weatherstripping

Affected School Rooms
Corridors

Existing Conditions
There are exterior doors throughout the school buildings. All of the doors have weatherstripping that is in various states of effectiveness. Particular areas of issues are at the center posts for double doors and at the thresholds.

Upgrade Recommendation
Install new weatherstripping on all exterior doors. This includes all for sides of each door. One door in the Votech corridor also had an open hole through the door that should be patched.

Quality of Life Implications
In addition to the energy savings, this will also limit uncomfortable drafts that negatively affect occupants.

Specifications

2.8 Door Weatherstripping

Existing Cooling Infiltration:

High School	12 doors	x	6.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	4,374 Btu/hr
Elem / Middle	14 doors	x	6.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	5,103 Btu/hr
Elem Gym	10 doors	x	6.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	3,645 Btu/hr
Gym / Votech	11 doors	x	10.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	6,683 Btu/hr
Total Existing Cooling Infiltration Load:									=	4,374 Btu/hr

Recommended Cooling Infiltration:

High School	12 doors	x	2.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	1,458 Btu/hr
Elem / Middle	14 doors	x	2.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	1,701 Btu/hr
Elem Gym	10 doors	x	2.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	1,215 Btu/hr
Gym / Votech	11 doors	x	2.00	cfm/door	x	(43.5-30.0)	Dh x	4.5	=	1,337 Btu/hr
Total Recommended Cooling Infiltration Load Reduction:									=	1,458 Btu/hr
Total Cooling Infiltration Load Reduction:									=	2,916 Btu/hr

Cooling Savings:

Existing Cooling Electrical Consumption:

High School	4,374	Btu/hr ÷	12,000	ton/Btu	x	1.10	kW/ton x	800	FLH =	321 kWh/yr
Elem / Middle	5,103	Btu/hr ÷	12,000	ton/Btu	x	1.00	kW/ton x	800	FLH =	340 kWh/yr
Elem Gym	3,645	Btu/hr ÷	12,000	ton/Btu	x	1.10	kW/ton x	800	FLH =	267 kWh/yr
Gym / Votech	6,683	Btu/hr ÷	12,000	ton/Btu	x	0.95	kW/ton x	800	FLH =	423 kWh/yr
Total Existing Electrical Consumption:									=	321 kWh/yr

Recommended Cooling Electrical Consumption:

High School	1,458	Btu/hr ÷	12,000	ton/Btu	x	1.10	kW/ton x	800	FLH =	107 kWh/yr
Elem / Middle	1,701	Btu/hr ÷	12,000	ton/Btu	x	1.00	kW/ton x	800	FLH =	113 kWh/yr
Elem Gym	1,215	Btu/hr ÷	12,000	ton/Btu	x	1.10	kW/ton x	800	FLH =	89 kWh/yr
Gym / Votech	1,337	Btu/hr ÷	12,000	ton/Btu	1	0.95	kW/ton x	800	FLH =	85 kWh/yr
Total Recommended Cooling Electrical Consumption:									=	107 kWh/yr
Total Cooling Electrical Consumption Savings:									=	214 kWh/yr

Cooling - Electrical Demand

Existing Cooling Electrical Demand:

High School	4,374	Btu/hr ÷	12,000	ton/Btu	x	1.10	kW/ton x	80%	Demand Div. =	0.32 kW/mo
Elem / Middle	5,103	Btu/hr ÷	12,000	ton/Btu	x	1.00	kW/ton x	80%	Demand Div. =	0.34 kW/mo
Elem Gym	3,645	Btu/hr ÷	12,000	ton/Btu	x	1.10	kW/ton x	80%	Demand Div. =	0.27 kW/mo
Gym / Votech	6,683	Btu/hr ÷	12,000	ton/Btu	x	0.95	kW/ton x	80%	Demand Div. =	0.42 kW/mo
Total Existing Cooling Electrical Demand:									=	0.32 kW/mo

Recommended Cooling Electrical Demand:

High School	1,458	Btu/hr ÷	12,000	ton/Btu		1.10	kW/ton x	80%	Demand Div. =	0.11 kW/mo
Elem / Middle	1,701	Btu/hr ÷	12,000	ton/Btu		1.00	kW/ton x	80%	Demand Div. =	0.11 kW/mo
Elem Gym	1,215	Btu/hr ÷	12,000	ton/Btu		1.10	kW/ton x	80%	Demand Div. =	0.09 kW/mo
Gym / Votech	1,337	Btu/hr ÷	12,000	ton/Btu		0.95	kW/ton x	80%	Demand Div. =	0.08 kW/mo
Total Recommended Cooling Electrical Demand:									=	0.11 kW/mo
Total Cooling Electrical Demand Savings:									=	0.21 kW/mo
Assumes 7 months per year usage:										
Annual Electric Demand Savings:									=	1 kW/yr

Existing Heating Infiltration:

High School	12 doors	x	6	cfm/door	x	65	DT °F x	1.08	=	5,054 Btu/hr
Elem / Middle	14 doors	x	6	cfm/door	x	65	DT °F x	1.08	=	5,897 Btu/hr
Elem Gym	10 doors	x	6	cfm/door	x	65	DT °F x	1.08	=	4,212 Btu/hr
Gym / Votech	11 doors	x	10	cfm/door	x	65	DT °F x	1.08	=	7,722 Btu/hr
Total Existing Heat Infiltration Load:									=	5,054 Btu/hr

Recommended Heating Infiltration:

High School	12 doors	x	2	cfm/door	x	65	DT °F x	1.08	=	1,685 Btu/hr
Elem / Middle	14 doors	x	2	cfm/door	x	65	DT °F x	1.08	=	1,966 Btu/hr
Elem Gym	10 doors	x	2	cfm/door	x	65	DT °F x	1.08	=	1,404 Btu/hr
Gym / Votech	11 doors	x	2	cfm/door	x	65	DT °F x	1.08	=	1,544 Btu/hr
Total Recommended Heat Infiltration Load:									=	1,685 Btu/hr
Total Heat Infiltration Load Reduction:									=	3,370 Btu/hr

2.8 Door Weatherstripping

Heating Savings:

Existing Heating Electrical Consumption:													
High School	5,054	Btu/hr	÷	72	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 44 Gal/yr
Elem / Middle	5,897	Btu/hr	÷	72	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 51 Gal/yr
Elem Gym	4,212	Btu/hr	÷	72	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 36 Gal/yr
Gym / Votech	7,722	Btu/hr	÷	72	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 67 Gal/yr
Total Existing Heating Electrical Consumption:													198 Gal/yr

Recommended Heating Electrical Consumption:													
High School	1,685	Btu/hr	÷	72	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 15 Gal/yr
Elem / Middle	1,966	Btu/hr	÷	73	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 17 Gal/yr
Gym / Votech	1,544	Btu/hr	÷	74	°F x	45,568	hr-°F	÷	80%	$Comb._{eff.}$	÷ 91,500	Btu/GAL	= 13 Gal/yr
Total Recommended Heating Electrical Consumption:													44 Gal/yr

Total Heating Electrical Consumption Savings:	154 Gal/yr

2.9 Water Heater Setpoint

Affected School Rooms
Cafeteria

Existing Conditions
The existing domestic water heater is set to 180°F. The dishwasher uses chemicals for sanitation and therefore does not need water that hot.

Upgrade Recommendation
Lower the domestic water heater setpoint in the kitchen to 140°F.

Quality of Life Implications
In addition to the energy savings, this will reduce the risk of scalding.

Specifications

2.9 Water Heater Setpoint

Water Heating - Natural Gas Consumption

Existing Water Heating Natural GasConsumption:

Kitchen Water Heater	2,063	Btu/hr	x	8,760	hrs	÷ 80% Comb.$_{eff.}$	÷	91,500	Btu/GAL	= 247 Gal/yr
Total Existing Water Heating Natural Gas Consumption:										= 247 Gal/yr

Recommended Water Heating Natural Gas Consumption:

Kitchen Water Heater	1,299	Btu/hr	x	8,760	hrs	÷ 80% Comb.$_{eff.}$	÷	91,500	Btu/GAL	= 155 Gal/yr
Total Recommended Water Heating Natural Gas Consumption Savings:										= 155 Gal/yr
Total Water Heating Natural Gas Consumption:										= 91 Gal/yr

2.10 Refrigerator and Freezer Consolidation

Affected School Rooms
Kitchen and Cafeteria

Existing Conditions
Currently there are three refrigerated milk cases and one standard refrigerator in the kitchen and cafeteria that are plugged in throughout the summer and other extended breaks.

Upgrade Recommendation
Initiate a plan that the refrigerated cases and refrigerator shall be unplugged during summer and other extended breaks. During this time any remaining food will be consolidated into the walk-in refrigerator or freezer.

Quality of Life Implications
This is purely an energy saving measure.

Specifications

2.10 Refrigerator and Freezer Consolidation

Refrigerator and Freezer Consolidation Savings

Equipment	Qty.	Volts	Watts	kW	Corr. Factor	Adjusted kW	kWh/year	$/year
Milk Case	3	115	276	0.828	0.250	0.207	298	$36.79
Refrigerator	1	115	100	0.100	0.250	0.025	36	$4.44
						Total Savings:	**334**	**$41.23**

2.11 Unplug Laptop Charging Carts

Affected School Rooms
Classrooms

Existing Conditions
Laptop charge carts are found in most classrooms and are plugged into electrical outlets at all times. The cart is continuously using power while plugged in even during long periods of the building being unoccupied, like over scheduled breaks in the school year.

Upgrade Recommendation
Ensure teachers unplug charging carts during extended breaks as an added measure to their existing shutdown checklist.

Quality of Life Implications
This is purely an energy saving measure.

Specifications

2.11 Unplug Laptop Charging Carts

Unplug Laptop Charging Carts

Equipment	Qty.	Volts	Watts	kW	Corr. Factor	Adjusted kW	kWh/year	$/year
Laptop Charging Carts	13	115	60	0.780	1.000	0.780	1,123	$138.62
						Total Savings:	**1,123.2**	**$138.62**

3. RFP Submission Guidelines

Please submit RFP Responses to:

H. W. Byers Attendance Center
4178 Highway 72 East
Holly Springs, MS 38635
Attn: Billy Gray

(662) 252-4271

bgray@mcschools.us

Your Response should include the following:

(1) Appendix – Intent to Bid and Company Overview

(2) Your Detailed Bid(s)

Appendix

Section	Topic	Intent to Bid
2.1	Lighting Upgrades	
2.2	Lighting Controls	
2.3	Install Window Film	
2.4	Computer Plug Loads – Management Software	
2.5	Vending Machine Controls	
2.7	HVAC Controls – Labor Only	
2.8	Install Door Weatherstripping	

Company Overview

(Provide below or on additional pages. Attach Bid(s) to this Appendix)